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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/897,573	07/02/2001	Richard J. Markle	2000.089400	1243
23720	7590	01/10/2006	EXAMINER	
WILLIAMS, MORGAN & AMERSON			STOCK JR, GORDON J	
10333 RICHMOND, SUITE 1100				
HOUSTON, TX 77042			ART UNIT	PAPER NUMBER
			2877	

DATE MAILED: 01/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/897,573

Applicant(s)

MARKLE ET AL.

Examiner

Gordon J. Stock

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 4, 13, 21 and 37 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 5-11, 14-19, 22-36 and 38-47 is/are rejected.
- 7) ☒ Claim(s) 3, 12 and 20 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. The Amendment received on October 11, 2005 has been entered into the record.

#### *Drawings*

2. The Drawings filed on July 2, 2001 are accepted by the Examiner.

#### *Claim Rejections - 35 USC § 102*

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. **Claims 42-44** are rejected under 35 U.S.C. 102(a) as being anticipated by **Marinaro et al. (6,245,584)—cited by applicant.**

As for claims **42-44**, Marinaro in a method for detecting adjustment error in photolithographic stepping printer discloses the following: a test structure comprising a first plurality of lines and a second plurality of lines intersecting the first plurality of lines, the first and second pluralities of lines defining a grid having openings (Fig. 5: 34); further comprising a processing layer, a photoresist layer, the grid being defined in the process layer (col. 3, lines 15-20 and lines 34-37; col. 4, lines 13-15).

#### *Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1, 2, 5-11, 14-19, 22-36, 38-41, 45-47** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Marinaro et al. (6,245,584)—cited by applicant**.

As for **claims 1, 5-10, 19, 22-26**, Marinaro in a method for detecting adjustment error in photolithographic stepping printer discloses the following: providing a wafer having a test structure comprising a plurality of intersecting lines that define a grid having openings (Fig. 5: 34); illuminating at least a portion of the grid with a light source and measuring light reflected from the illuminated portion of the grid with an opto-electronic scanner (col. 4, lines 60-62) to generate a reflection profile, a digital image, that will be compared with a library of predetermined patterns, target profiles (col. 4, lines 65-67); wherein, at least one parameter of an operating recipe of a photolithography tool is determined in order to be corrected for subsequent wafers and reworking (col. 2, lines 7-25; col. 4, lines 30-55); and an intensity profile of the digital image is used from a color gradient profile (col. 4, lines 30-35); wherein, a fault condition is identified (col. 4, lines 30-55). He does not explicitly state that a dimension of the grid is determined based on the reflection profile compared to the target profile nor does he explicitly state the type of dimension determined. He does suggest that dimensions are determined for abnormalities such as unevenness or abnormalities of images are determined as adjustment error of the photolithography system through comparison of grid images with predetermined patterns (col. 4, lines 50-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that a grid dimension such as width was determined via pattern analysis through pattern comparison of target profiles in order to determine the amount of unevenness in the grid image to evaluate the adjustment error of the stepper.

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As for **claims 2, 11, 14, 15, 16, 17, 18**, Marinaro in a method for detecting adjustment error in photolithographic stepping printer discloses the following: providing a wafer having a test structure comprising a plurality of intersecting lines that define a grid having openings (Fig. 5: 34); illuminating at least a portion of the grid with a light source and measuring light reflected from the illuminated portion of the grid with an opto-electronic scanner (col. 4, lines 60-62) to generate a reflection profile, a digital image, that will be compared with a library of predetermined patterns, reference reflection profiles (col. 4, lines 65-67); wherein, at least one parameter of an operating recipe of a photolithography tool is determined in order to be corrected for subsequent wafers and reworking (col. 2, lines 7-25; col. 4, lines 30-55); and an intensity profile of the digital image is used from a color gradient profile (col. 4, lines 30-35); wherein, a fault condition is identified (col. 4, lines 30-55). He does not explicitly state that a dimension of the grid is determined based on the reflection profile compared to a closest selected reference profile having an associated grid dimension metric nor does he explicitly state the type of dimension determined. He does suggest that dimensions are determined for abnormalities such as unevenness or abnormalities of images are determined as adjustment error of the photolithography system through comparison of grid images with predetermined patterns via pattern analysis and thereby suggests a comparison of closest predetermined patterns of a particular metric with the grid image being evaluated in order to determine the amount of image unevenness (col. 4, lines 50-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that a grid dimension such as width was determined via pattern analysis through pattern comparison of selected reference profiles with a dimension

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metric closest to the grid image being evaluated in order to accurately determine the amount of unevenness in the grid image to evaluate the adjustment error of the stepper.

As for **claims 27, 28, 29 30, 31, 40, 41, 45-47**, Marinaro in an apparatus for detecting adjustment error in photolithographic stepping printer discloses the following: means for receiving a wafer having a test structure comprising a plurality of intersecting lines that define a grid having openings (Fig. 2: 32, 30; Fig. 5: 34); a light source adapted to illuminate at least a portion of the grid and a detector adapted to measure light reflected from the illuminated portion of the grid to generate a reflection profile, an opto-electronic scanner (col. 4, line 62); a data processing unit, a programmed digital computer (col. 4, line 64); wherein, the reflection profile is compared to a library of reference reflection profiles otherwise target profiles, predetermined patterns (col. 4, lines 65-67); wherein a reflection profile is based on intensity through color gradients obtained (col. 4, lines 30-35); a reflectometer is used (col. 4, lines 60-62). He does not explicitly state that the determining means, the computer, determines a dimension of the grid based on the reflection profile compared to the target profile nor does he explicitly state the type of dimension determined. He does suggest that dimensions are determined for abnormalities such as unevenness or abnormalities of images are determined as adjustment error of the photolithography system through comparison of grid images with predetermined patterns (col. 4, lines 50-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that a grid dimension such as width was determined via pattern analysis with the digital computer through pattern comparison of target profiles in order to determine the amount of unevenness in the grid image to evaluate the adjustment error of the stepper.

In addition, he does not explicitly state that a dimension of the grid is determined based on the reflection profile compared to a closest selected reference profile having an associated grid dimension metric nor does he explicitly state the type of dimension determined and therefore, the particular means associated with the steps. He does suggest that dimensions are determined for abnormalities such as unevenness or abnormalities of images are determined as adjustment error of the photolithography system through comparison of grid images with predetermined patterns via pattern analysis and thereby suggests a comparison of closest predetermined patterns of a particular metric with the grid image being evaluated in order to determine the amount of image unevenness via processing means, the digital computer (col. 4, lines 50-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that a grid dimension such as width was determined via pattern analysis by processing means, a digital computer, through pattern comparison of selected reference profiles with a dimension metric closest to the grid image being evaluated in order to accurately determine the amount of unevenness in the grid image to evaluate the adjustment error of the stepper.

As for **claims 32, 33, 34, 35, 36, 38, 39**, Marinaro in an apparatus for detecting adjustment error in photolithographic stepping printer discloses the following: a processing tool that is a photolithography tool (Fig. 2: 12); a metrology tool adapted to receive a wafer having a test structure comprising a plurality of intersecting lines that define a grid having openings (Fig. 5: 34) comprising a light source adapted to illuminate at least a portion of the grid and a detector adapted to measure light reflected from the illuminated portion of the grid to generate a reflection profile, an opto-electronic scanner (col. 4, line 62); a data processing unit, a

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programmed digital computer (col. 4, line 64); wherein, the reflection profile is compared to a library of reference reflection profiles otherwise target profiles, predetermined patterns (col. 4, lines 65-67); wherein a reflection profile is based on intensity through color gradients obtained (col. 4, lines 30-35); a reflectometer is used (col. 4, lines 60-62); wherein, lithographic parameters are determined (col. 4, lines 30-67; col. 2, lines 15-35). He does not explicitly state that the data processing unit, the digital computer, determines a dimension of the grid based on the reflection profile compared to the target profile nor does he explicitly state the type of dimension determined. He does suggest that dimensions are determined for abnormalities such as unevenness or abnormalities of images are determined as adjustment error of the photolithography system through comparison of grid images with predetermined patterns (col. 4, lines 50-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that a grid dimension such as width was determined via pattern analysis with the digital computer through pattern comparison of target profiles in order to determine the amount of unevenness in the grid image to evaluate the adjustment error of the stepper.

In addition, he does not explicitly state that a dimension of the grid is determined based on the reflection profile compared to a closest selected reference profile having an associated grid dimension metric nor does he explicitly state the type of dimension determined being performed by the digital computer. He does suggest that dimensions are determined for abnormalities such as unevenness or abnormalities of images are determined as adjustment error of the photolithography system through comparison of grid images with predetermined patterns via pattern analysis and thereby suggests a comparison of closest predetermined patterns of a particular metric with the grid image being evaluated in order to determine the amount of image



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unevenness via processing means, the digital computer (col. 4, lines 50-67). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that a grid dimension such as width was determined via pattern analysis by processing means, a digital computer, through pattern comparison of selected reference profiles with a dimension metric closest to the grid image being evaluated in order to accurately determine the amount of unevenness in the grid image to evaluate the adjustment error of the stepper.

As for an actual controller, he does not specifically state this, but he mentions the determination of adjustment errors of a photolithographic system (col. 4, lines 30-67) and discloses adjusting photolithographic parameters such as focus and tilt to adequately process wafers (col. 2, lines 15-35). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a controller in order to determine photolithographic parameters in order to adjust these parameters to have adequate processing of subsequent wafers and to rework incorrectly processed wafers.

*Allowable Subject Matter*

7. **Claims 3, 12, 20** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Claims 4, 13, 21, and 37** are allowed.

As to **claim 3**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining grid dimensions the particular determining at least one parameter of an operating recipe of an etch tool step, in combination with the rest of the limitations of **claim 3**.

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As to **claim 4**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining grid dimensions the particular determining at least one parameter of an operating recipe of an etch tool, in combination with the rest of the limitations of **claim 4**.

As to **claim 12**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining grid dimensions the particular determining at least one parameter of an operating recipe of an etch tool step, in combination with the rest of the limitations of **claim 12**.

As to **claim 13**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining grid dimensions the particular determining at least one parameter of an operating recipe of an etch tool, in combination with the rest of the limitations of **claim 13**.

As to **claim 20**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining grid dimensions the particular determining at least one parameter of an operating recipe of an etch tool step, in combination with the rest of the limitations of **claim 20**.

As to **claim 21**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method for determining grid dimensions the particular determining at least one parameter of an operating recipe of an etch tool, in combination with the rest of the limitations of **claim 21**.

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As to **claim 37**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a processing line the particular controller, in combination with the rest of the limitations of **claim 37**.

***Response to Arguments***

8. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. As for the allowable subject matter set forth in the previous action in regards to claims 2, 5, 6, 11, 14-18, 22, 23, 28, 32-36, 38-40, and 46 the Examiner apologizes for the inconvenience but upon further search and consideration of *Marinaro et al.* (6,245,584) a new rejection to these claims were made. See above.

***Fax/Telephone Numbers***

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

*Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (571) 273-8300*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

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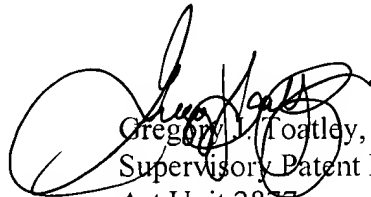
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MD

gs

January 4, 2006



Gregory J. Toatley, Jr.  
Supervisory Patent Examiner  
Art Unit 2877